

**EXPERIMENTS IN THE WESTERN ATLANTIC  
NORTHEAST DISTANT WATERS TO EVALUATE  
SEA TURTLE MITIGATION MEASURES IN THE  
PELAGIC LONGLINE FISHERY**

**SUMMARY OF STATISTICAL ANALYSIS**

Arvind Shah, John Watson, Daniel Foster, and Sheryan Epperly

March 3, 2004

### Statistical Methods:

Generalized linear models were fitted to investigate the relationship between the catch rate (or catch probability) and the explanatory variables such as hook type, sea surface temperature, day light soak time, total soak time, vessel effect, and pairing effect in case of matched-paired hook types per set. In particular, logistic regression analysis (with maximum likelihood estimation procedure) for binary response (turtle) data and traditional regression analysis (with least squares estimation procedure) for continuous response (fish) data was used. The primary purpose for modeling was to estimate reduction rates due to various experimental treatments (hook types) controlling for the explanatory variables mentioned above. The measurements for each variable per section (segments) within each set were averaged to get overall information per set on sea surface temperature and hook soak time. The modeling results presented used set as the experimental unit. In some cases, because of the problems with model convergence, singularity of design matrix, and difficulties in obtaining unique parameter estimates, the vessel and/or pairing effect terms were dropped from the model. Inclusion of these terms made the model saturated leaving no degrees of freedom for other essential effects. An effort was made to use simpler and uniform models consistently wherever possible.

The confidence intervals on appropriate model coefficients (or its functions) were constructed to arrive at the confidence intervals on reduction rate for each of the treatments. For treatment comparisons, tables with partial summary results of the fitted models for loggerhead turtles, leatherback turtles, swordfish, and bigeye tuna are presented. All analyses on fish data utilized the original units of measurements (*e.g.* dressed weight in pounds). Since the probability of a turtle catch (per hook) for the hook types being compared is fairly small, the catch probability ratio for the two hook types was approximated from the odds ratio (corresponding to hook types) estimated from the fitted logistic regression models. Thus, subtracting the odds ratio (and confidence limits) from 1 provides an estimate of reduction rate (and related confidence limits) due to experimental hook. Approximation of relative risk for other factors also utilized odds ratio due to low magnitude of catch probability. In the case of swordfish and bigeye tuna, where catch weight per hook is modeled through traditional regression models, a confidence interval on absolute weight reduction (per hook) was constructed. The limits of this confidence interval were then divided by average catch per control hook to construct approximate confidence interval on reduction rate.

The ratio is a natural scale for multiplicative models while the difference is a natural scale for additive models. Thus, ratio of odds (of turtle capture for control and experimental hooks) is a natural scale for the logistic models while the difference in the means (of catch per hook for the control and experimental hooks) is a natural scale for the traditional regression model for continuous response variable.

## SUMMARY DOCUMENT FOR COMPARING HOOK TYPES A vs B and A vs C

### HOOK TYPES:

A = Offset 9/0 J hook with squid bait (used in 2002 & 2003 experiments)  
B = Non-Offset 18/0 Circle hook with squid bait (used in 2002 & 2003 experiments)  
B1 = Offset 18/0 Circle hook with squid bait (used only in 2002 experiment)  
C = Offset 18/0 Circle hook with mackerel bait (used in 2002 & 2003 experiments)  
D = 20/0 Circle Hook with Mackerel Bait (used only in 2003)  
E = 10/0 J tuna (Japanese) Hook with Mackerel Bait (used only in 2003)  
F = Offset 9/0 J hook with mackerel bait (used only in 2002)

### 2002 Experiment:

Trt 4: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Non-offset 18/0 circle hook with squid bait (B)  
  
Trt 5: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Offset 18/0 circle hook with squid bait (B1)  
  
Trt 6: Cont: Offset 9/0 J hook with mackerel bait (F)  
Expt: Offset 18/0 circle hook with mackerel bait (C)

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### 2003 Experiment:

#### SWORDFISH DIRECTED SETS:

Trt 4: (Set 1) Cont: 9/0 J Hook with Squid Bait (A)  
Expt: Non-offset 18/0 Circle Hook with Squid Bait (B)  
  
Trt 7: (Set 2) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 20/0 Circle Hook with Mackerel Bait (D)  
  
Trt 8: (Set 3) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 10/0 J tuna (Japanese) Hook with Mackerel Bait (E)

AKS notes: applicable to attached tables 1 and 2  
(C for control and E for Experimental below, # before it is trt #, and # in parenthesis is year)

Lines 1 & 7 compare : 4C (2002) vs 4E (2002)  
Lines 2 & 8 compare : 4C (2003) vs 4E (2003)  
Lines 3 & 9 compare : 4C (2002) and 4C (2003) vs 4E (2002) and 4E (2003)  
Lines 4 & 10 compare : 4C (2002) and 5C (2002) vs 6E (2002)  
Lines 5 & 11 compare : 4C (2003) vs 7C (2003) and 8C (2003)  
Lines 6 & 12 compare : 4C (2002) and 5C (2002) and 4C (2003) vs 6E (2002) and 7C (2003) and 8C (2003)

SUMMARY TABLE 1 (TURTLES - COUNTS)

Obs	species	year	comparison	OddsRatio	lcl	ucl	red_rate	lconfint	uconfint	yr	p_year
					95%	95%		95%	95%		
1	LH	2002	A_vs_B	0.125	0.044	0.352	87.5	64.8	95.6	0	
2	LH	2003	A_vs_B	0.354	0.200	0.627	64.6	37.3	80.0	1	
3	LH	both	A_vs_B	0.259	0.158	0.423	74.1	57.7	84.2	.	0.0002
4	LH	2002	A_vs_C	0.096	0.030	0.305	90.4	69.5	97.0	0	
5	LH	2003	A_vs_C	0.142	0.063	0.323	85.8	67.7	93.7	1	
6	LH	both	A_vs_C	0.119	0.062	0.230	88.1	77.0	93.8	.	0.3027
7	LB	2002	A_vs_B	0.361	0.191	0.681	63.9	31.9	80.9	0	
8	LB	2003	A_vs_B	0.103	0.031	0.339	89.7	66.1	96.9	1	
9	LB	both	A_vs_B	0.246	0.142	0.425	75.4	57.5	85.8	.	0.0017
10	LB	2002	A_vs_C	0.346	0.187	0.637	65.4	36.3	81.3	0	
11	LB	2003	A_vs_C	0.352	0.193	0.644	64.8	35.6	80.7	1	
12	LB	both	A_vs_C	0.367	0.240	0.560	63.3	44.0	76.0	.	0.0258

SUMMARY TABLE 2 (FISH - WEIGHT)

Obs	sp	year	comparison	cphcont	cphexpt	red_rate	lconfint	uconfint	yr	p_red	p_year
				(LS Mean)	(LS Mean)		95%	95%			
1	SF	2002	A_vs_B	1.81617	1.22448	32.5793	18.7557	46.403	0	0.0001	.
2	SF	2003	A_vs_B	1.74703	1.24839	28.5420	14.5440	42.540	1	0.0001	.
3	SF	both	A_vs_B	1.78373	1.24425	30.2442	20.3841	40.104	.	0.0001	0.2779
4	SF	2002	A_vs_C	1.94827	2.53734	-30.2353	-46.2862	-14.184	0	0.0002	.
5	SF	2003	A_vs_C	1.77898	1.94303	-9.2218	-24.2687	5.825	1	0.2291	.
6	SF	both	A_vs_C	1.84998	2.20277	-19.0703	-30.1667	-7.974	.	0.0008	0.0001
7	BT	2002	A_vs_B	0.21594	0.27904	-29.2231	-78.0939	19.648	0	0.2403	.
8	BT	2003	A_vs_B	0.13550	0.16292	-20.2387	-72.0180	31.541	1	0.4428	.
9	BT	both	A_vs_B	0.17709	0.22017	-24.3262	-58.8764	10.224	.	0.1673	0.0021
10	BT	2002	A_vs_C	0.20397	0.03839	81.1792	48.7660	113.592	0	0.0001	.
11	BT	2003	A_vs_C	0.14336	0.01773	87.6350	62.1983	113.072	1	0.0001	.
12	BT	both	A_vs_C	0.17339	0.03426	80.2387	58.7154	101.762	.	0.0001	0.0087

LH, A vs B, 2002 (paired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-29.4598	2.4154	148.7642	<.0001
hooktype	1	-2.0831	0.5306	15.4140	<.0001
mtempot	1	0.2983	0.0371	64.5335	<.0001
mtotst	1	0.00721	0.00198	13.2536	0.0003
mdayst	1	-0.0131	0.00390	11.3146	0.0008

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.125	0.044 0.352
mtempot	1.348	1.253 1.449
mtotst	1.007	1.003 1.011
mdayst	0.987	0.979 0.995

\* convergence (and model fit) questionable with vessels and sets in the model

LH, A vs B, 2003 (paired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-43.4977	2.7330	253.3049	<.0001
hooktype	1	-1.0378	0.2915	12.6737	0.0004
mtempot	1	0.4847	0.0386	157.4920	<.0001
mtotst	1	0.0112	0.00181	38.5154	<.0001
mdayst	1	-0.0164	0.00356	21.1265	<.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.354	0.200 0.627
mtempot	1.624	1.505 1.751
mtotst	1.011	1.008 1.015
mdayst	0.984	0.977 0.991

\* convergence (and model fit) questionable with vessels and sets in the model

LH, A vs B, both years (paired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-35.5439	1.7692	403.6019	<.0001
hooktype	1	-1.3525	0.2513	28.9686	<.0001
mtempot	1	0.3650	0.0241	229.8034	<.0001
mtotst	1	0.00915	0.00127	51.9540	<.0001
mdayst	1	-0.0135	0.00249	29.3613	<.0001
yr	1	0.9076	0.2442	13.8151	0.0002

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.259	0.158	0.423
mtempot	1.441	1.374	1.510
mtotst	1.009	1.007	1.012
mdayst	0.987	0.982	0.991
yr	2.478	1.536	3.999

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- Year effect significant
  - hooktype by year interaction not significant
  - convergence (and model fit) questionable with vessels and sets in the model
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LH, A vs C, 2002 (unpaired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-26.0166	2.0402	162.6104	<.0001
hooktype	1	-2.3451	0.5906	15.7673	<.0001
mtempot	1	0.2435	0.0308	62.5292	<.0001
mtotst	1	0.00591	0.00122	23.4171	<.0001
mdayst	1	-0.00702	0.00232	9.1893	0.0024

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.096	0.030	0.305
mtempot	1.276	1.201	1.355
mtotst	1.006	1.004	1.008
mdayst	0.993	0.989	0.998

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LH, A vs C, 2003 (unpaired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-43.2450	3.0382	202.6055	<.0001
hooktype	1	-1.9490	0.4182	21.7247	<.0001
mtempot	1	0.4867	0.0430	128.2633	<.0001
mtotst	1	0.00999	0.00186	28.8634	<.0001
mdayst	1	-0.0139	0.00364	14.4779	0.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.142	0.063	0.323
mtempot	1.627	1.495	1.770
mtotst	1.010	1.006	1.014
mdayst	0.986	0.979	0.993

LH, A vs C, both years (unpaired data)  
 Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-30.9352	1.5530	396.7936	<.0001
hooktype	1	-2.1269	0.3357	40.1301	<.0001
mtempot	1	0.3144	0.0226	193.3892	<.0001
mtotst	1	0.00671	0.000959	48.9704	<.0001
mdayst	1	-0.00856	0.00186	21.1401	<.0001
yr	1	0.2052	0.1991	1.0622	0.3027

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.119	0.062	0.230
mtempot	1.369	1.310	1.431
mtotst	1.007	1.005	1.009
mdayst	0.991	0.988	0.995
yr	1.228	0.831	1.814

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- year effect not significant
  - hooktype by year interaction not significant
  - adjusted reduction rate can change (compared to unadjusted rate) due to adjusting for other variables

LB, A vs B, 2002 (paired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-20.2140	2.8567	50.0704	<.0001
hooktype	1	-1.0191	0.3236	9.9150	0.0016
mtempot	1	0.1833	0.0440	17.3261	<.0001
mtotst	1	0.00115	0.00147	0.6143	0.4332
mdayst	1	0.000679	0.00240	0.0800	0.7772

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.361	0.191	0.681
mtempot	1.201	1.102	1.309
mtotst	1.001	0.998	1.004
mdayst	1.001	0.996	1.005

\* convergence (and model fit) questionable with vessels and sets in the model

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LB, A vs B, 2003 (paired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-25.0803	4.2848	34.2605	<.0001
hooktype	1	-2.2691	0.6065	13.9972	0.0002
mtempot	1	0.2666	0.0632	17.8161	<.0001
mtotst	1	-0.00185	0.00209	0.7896	0.3742
mdayst	1	0.00585	0.00344	2.8979	0.0887

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.103	0.031	0.339
mtempot	1.306	1.154	1.478
mtotst	0.998	0.994	1.002
mdayst	1.006	0.999	1.013

- convergence (and model fit) questionable with vessels and sets in the model

LB, A vs B, both years (paired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-21.4468	2.3413	83.9124	<.0001
hooktype	1	-1.4022	0.2791	25.2420	<.0001
mtempot	1	0.2108	0.0353	35.6187	<.0001
mtotst	1	0.000097	0.00119	0.0067	0.9349
mdayst	1	0.00220	0.00192	1.3111	0.2522
yr	1	-0.7568	0.2407	9.8850	0.0017

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.246	0.142	0.425
mtempot	1.235	1.152	1.323
mtotst	1.000	0.998	1.002
mdayst	1.002	0.998	1.006
yr	0.469	0.293	0.752

- Year effect significant
  - hooktype by year interaction not significant
  - convergence (and model fit) questionable with vessels and sets in the model
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LB, A vs C, 2002 (unpaired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-19.1730	2.5783	55.2989	<.0001
hooktype	1	-1.0627	0.3122	11.5874	0.0007
mtempot	1	0.1976	0.0384	26.5506	<.0001
mtotst	1	-0.00128	0.00142	0.8171	0.3660
mdayst	1	0.000297	0.00208	0.0204	0.8863

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.346	0.187	0.637
mtempot	1.219	1.130	1.314
mtotst	0.999	0.996	1.002
mdayst	1.000	0.996	1.004

LB, A vs C, 2003 (unpaired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-21.2304	3.5063	36.6618	<.0001
hooktype	1	-1.0435	0.3078	11.4963	0.0007
mtempot	1	0.2293	0.0517	19.6451	<.0001
mtotst	1	-0.00416	0.00201	4.3006	0.0381
mdayst	1	0.00715	0.00272	6.9203	0.0085

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower Limit	Upper Limit
hooktype	0.352	0.193	0.644
mtempot	1.258	1.136	1.392
mtotst	0.996	0.992	1.000
mdayst	1.007	1.002	1.013

- adjusted reduction rate can change (compared to unadjusted rate) due to adjusting for other variables

LB, A vs C, both years (unpaired data)  
Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-19.6660	2.0947	88.1473	<.0001
hooktype	1	-1.0033	0.2157	21.6326	<.0001
mtempot	1	0.2057	0.0309	44.4426	<.0001
mtotst	1	-0.00208	0.00116	3.2151	0.0730
mdayst	1	0.00274	0.00161	2.9013	0.0885
yr	1	-0.4541	0.2037	4.9677	0.0258

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower Limit	Upper Limit
hooktype	0.367	0.240	0.560
mtempot	1.228	1.156	1.305
mtotst	0.998	0.996	1.000
mdayst	1.003	1.000	1.006
yr	0.635	0.426	0.947

- 
- year effect significant
  - hooktype by year interaction not significant
  - adjusted reduction rate can change (compared to unadjusted rate) due to adjusting for other variables

SF, A vs B, 2002 (paired data)

Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	1.81617072	0.09023889	<.0001	<.0001
1	1.22447477	0.09023889	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1.816171	1.638645 1.993697
1	1.224475	1.046949 1.402001

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.591696	0.340636 0.842756

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-0.94569	1.49091	-0.63	0.5263	-3.87875 1.98737
hooktype	1	-0.59170	0.12762	-4.64	<.0001	-0.84276 -0.34064
mtempot	1	0.04610	0.02250	2.05	0.0413	0.00184 0.09036
mtotst	1	-0.00083599	0.00068337	-1.22	0.2221	-0.00218 0.00050839
mdayst	1	0.00227	0.00103	2.21	0.0279	0.00024841 0.0042

\* model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

SF, A vs B, 2003 (paired data)

Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	1.74703290	0.08797186	<.0001	<.0001
1	1.24839413	0.08797186	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1.747033	1.574109 1.919956
1	1.248394	1.075471 1.421318

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.498639	0.254088 0.743190

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	2.40458	1.45735	1.65	0.0997	-0.46009 5.26926
hooktype	1	-0.49864	0.12441	-4.01	<.0001	-0.74319 -0.25409
mtempot	1	-0.00571	0.02223	-0.26	0.7975	-0.04941 0.03799
mtotst	1	-0.00208	0.00062682	-3.32	0.0010	-0.00331 -0.00084761
mdayst	1	0.00505	0.00104	4.87	<.0001	0.00301 0.00708

\* model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

SF, A vs B, both years (paired data)

Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	1.78372823	0.06361948	<.0001	<.0001
1	1.24425320	0.06361948	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1.783728	1.658834 1.908623
1	1.244253	1.119359 1.369148

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.539475	0.363597 0.715353

Level of yr	N	sfcpuh Mean	Std Dev	mtempot Mean	Std Dev	mtotst Mean	Std Dev	mdayst Mean	Std Dev
0	330	1.52032275	1.20939962	62.4946574	2.91298229	757.299122	112.364093	226.590719	75.968706
1	422	1.49771351	1.33328777	61.3679480	2.87785518	817.763979	166.965868	276.096137	100.852017

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	0.93070	1.05794	0.88	0.3793	-1.14619 3.00760
hooktype	1	-0.53948	0.08959	-6.02	<.0001	-0.71535 -0.36360
mtempot	1	0.01736	0.01589	1.09	0.2751	-0.01384 0.04856
mtotst	1	-0.00143	0.00045318	-3.16	0.0017	-0.00232 -0.00054015
mdayst	1	0.00378	0.00072909	5.19	<.0001	0.00235 0.00521
yr	1	-0.10390	0.09569	-1.09	0.2779	-0.29175 0.08395

- year effect not significant
- hooktype by year interaction not significant
- model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

SF, A vs C, 2002 (unpaired data)

Least Squares Means

hooktype	sfcpuh	Standard	H0: LSMEAN=0	H0: LSMean1=
	LSMEAN	Error	Pr >  t	LSMean2 Pr >  t
0	1. 94827032	0. 09097701	<. 0001	0. 0002
1	2. 53733586	0. 13051454	<. 0001	
hooktype	sfcpuh	95% Confidence	Limits	
	LSMEAN			
0	1. 948270	1. 769506	2. 127035	
1	2. 537336	2. 280883	2. 793789	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0. 589066	-0. 901780 -0. 276351

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1. 63341	1. 87076	-0. 87	0. 3830	-5. 30933 2. 04252
hooktype	1	0. 58907	0. 15915	3. 70	0. 0002	0. 27635 0. 90178
mtempot	1	0. 03386	0. 02726	1. 24	0. 2148	-0. 01970 0. 08742
mtotst	1	0. 00038437	0. 00089861	0. 43	0. 6690	-0. 00138 0. 00215
mdayst	1	0. 00521	0. 00133	3. 92	0. 0001	0. 00260 0. 00782

SF, A vs C, 2003 (unpaired data)

Least Squares Means

hooktype	sfcpuh	Standard	H0: LSMEAN=0	H0: LSMean1=
	LSMEAN	Error	Pr >  t	LSMean2 Pr >  t
0	1. 77897788	0. 10343458	<. 0001	0. 2291
1	1. 94303103	0. 08710104	<. 0001	
hooktype	sfcpuh	95% Confidence	Limits	
	LSMEAN			
0	1. 778978	1. 575760	1. 982196	
1	1. 943031	1. 771904	2. 114159	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0. 164053	-0. 431735 0. 103629

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	5. 22841	1. 61559	3. 24	0. 0013	2. 05427 8. 40256
hooktype	1	0. 16405	0. 13625	1. 20	0. 2291	-0. 10363 0. 43174
mtempot	1	-0. 06284	0. 02421	-2. 59	0. 0097	-0. 11041 -0. 01526
mtotst	1	-0. 00060029	0. 00074750	-0. 80	0. 4223	-0. 00207 0. 00086832
mdayst	1	0. 00314	0. 00108	2. 91	0. 0038	0. 00102 0. 00526

SF, A vs C, both years (unpaired data)

Least Squares Means

hooktype	sfcpuh LSMEAN	H0: LSMean1=		LSMean2 Pr >  t
		Standard Error	H0: LSMEAN=0 Pr >  t	
0	1.84997456	0.06917683	<.0001	0.0008
1	2.20276944	0.07583549	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Li mits	
		95% Confidence Li mits	95% Confidence Li mits
0	1.849975	1.714223	1.985726
1	2.202769	2.053952	2.351587

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Li mits for LSMean(i) - LSMean(j)	
		-0.352795	-0.558076	-0.147513
1	2	-0.352795	-0.558076	-0.147513

Level of yr	N	sfcpuh Mean	sfcpuh Std Dev	mtempot Mean	mtempot Std Dev	mtotst Mean	mtotst Std Dev	mdayst Mean	mdayst Std Dev
0	483	2.14096671	1.70624132	62.3738478	2.88031619	760.914685	98.664816	225.940798	67.6785183
1	507	1.87475644	1.51181076	61.4932975	2.81934133	815.995325	132.729252	288.457411	92.6964759

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Li mits
Intercept	1	2.23473	1.24712	1.79	0.0735	-0.21259 4.68204
hooktype	1	0.35279	0.10461	3.37	0.0008	0.14751 0.55808
mtempot	1	-0.01361	0.01831	-0.74	0.4574	-0.04953 0.02231
mtotst	1	-0.00027143	0.00057770	-0.47	0.6386	-0.00141 0.00086223
mdayst	1	0.00375	0.00084006	4.46	<.0001	0.00210 0.00539
yr	1	-0.58794	0.11210	-5.24	<.0001	-0.80791 -0.36796

- year effect significant
- hooktype by year interaction not significant

BT, A vs B, 2002 (paired data)

Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.21593492	0.03793058	<.0001	0.2403
1	0.27903757	0.03793058	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.215935	0.141314 0.290555
1	0.279038	0.204417 0.353658

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.063103	-0.168632 0.042427

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-2.78798	0.62668	-4.45	<.0001	-4.02085 -1.55512
hooktype	1	0.06310	0.05364	1.18	0.2403	-0.04243 0.16863
mtempot	1	0.03994	0.00946	4.22	<.0001	0.02134 0.05855
mtotst	1	0.00068543	0.00028724	2.39	0.0176	0.00012034 0.00125
mdayst	1	-0.00005012	0.00043175	-0.12	0.9076	-0.00089950 0.00079925

\* model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

BT, A vs B, 2003 (paired data)

Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.13549824	0.02523876	<.0001	0.4428
1	0.16292079	0.02523876	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.135498	0.085887 0.185109
1	0.162921	0.113310 0.212532

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.027423	-0.097583 0.042738

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-0.13292	0.41811	-0.32	0.7507	-0.95478 0.68895
hooktype	1	0.02742	0.03569	0.77	0.4428	-0.04274 0.09758
mtempot	1	0.00383	0.00638	0.60	0.5487	-0.00871 0.01637
mtotst	1	-0.00025619	0.00017983	-1.42	0.1550	-0.00060968 0.00009730
mdayst	1	0.00088005	0.00029706	2.96	0.0032	0.00029613 0.00146

\* model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

BT, A vs B, both years (paired data)

Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.17709324	0.02213242	<.0001	0.1673
1	0.22017328	0.02213242	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.177093	0.133644 0.220542
1	0.220173	0.176724 0.263623

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.043080	-0.104266 0.018106

Level of yr	N	btcpuh Mean	Std Dev	mtempot Mean	Std Dev	mtotst Mean	Std Dev	mdayst Mean	Std Dev
0	330	0.24748624	0.50425185	62.4946574	2.91298229	757.299122	112.364093	226.590719	75.968706
1	422	0.14920952	0.37057990	61.3679480	2.87785518	817.763979	166.965868	276.096137	100.852017

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1.24820	0.36804	-3.39	0.0007	-1.97073 -0.52568
hooktype	1	0.04308	0.03117	1.38	0.1673	-0.01811 0.10427
mtempot	1	0.02051	0.00553	3.71	0.0002	0.00966 0.03137
mtotst	1	0.00013551	0.00015766	0.86	0.3903	-0.00017399 0.00044501
mdayst	1	0.00039557	0.00025364	1.56	0.1193	-0.00010236 0.00089351
yr	1	-0.10294	0.03329	-3.09	0.0021	-0.16829 -0.03759

- year effect significant
- hooktype by year interaction not significant
- model fit problematic with vessels and sets in the model (due to singularity of the design matrix)

BT, A vs c, 2002 (unpaired data)  
Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1=
				LSMean2 Pr >  t
0	0.20396645	0.01923353	<.0001	<.0001
1	0.03838885	0.02759220	0.1648	
hooktype	btcpuh LSMEAN	95% Confidence Limits		
0	0.203966	0.166174	0.241759	
1	0.038389	-0.015828	0.092606	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)		
		1	2	0.165578	0.099466

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Li mits
Intercept	1	-1.91468	0.39550	-4.84	<.0001	-2.69181
hooktype	1	-0.16558	0.03365	-4.92	<.0001	-0.23169
mtempot	1	0.02497	0.00576	4.33	<.0001	0.01365
mtotst	1	0.00084113	0.00018998	4.43	<.0001	0.00046784
mdayst	1	-0.00034953	0.00028115	-1.24	0.2144	-0.00090198
						0.00020291

BT, A vs c, 2003 (unpaired data)  
Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1=
				LSMean2 Pr >  t
0	0.14335558	0.01409037	<.0001	<.0001
1	0.01772553	0.01186533	0.1358	
hooktype	btcpuh LSMEAN	95% Confidence Limits		
0	0.143356	0.115672	0.171039	
1	0.017726	-0.005586	0.041037	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Li mits for LSMean(i) - LSMean(j)		
		1	2	0.125630	0.089165

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Li mits
Intercept	1	0.07630	0.22008	0.35	0.7290	-0.35610
hooktype	1	-0.12563	0.01856	-6.77	<.0001	-0.16210
mtempot	1	0.00124	0.00330	0.38	0.7062	-0.00524
mtotst	1	-0.00022065	0.00010183	-2.17	0.0307	-0.00042071
mdayst	1	0.00059146	0.00014702	4.02	<.0001	0.00030261
						0.00088030

BT, A vs c, both years (unpaired data)  
Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.17338858	0.01257581	<.0001	<.0001
1	0.03426353	0.01378630	0.0131	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.173389	0.148710 0.198067
1	0.034264	0.007210 0.061317

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.139125	0.101806 0.176444

Level of yr	N	btcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	483	0.14980235	0.36584740	62.3738478	2.88031619	760.914685	98.664816	225.940798	67.6785183
1	507	0.07000944	0.21314859	61.4932975	2.81934133	815.995325	132.729252	288.457411	92.6964759

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-0.81001	0.22672	-3.57	0.0004	-1.25491 -0.36511
hooktype	1	-0.13913	0.01902	-7.32	<.0001	-0.17644 -0.10181
mtempot	1	0.01269	0.00333	3.81	0.0001	0.00616 0.01922
mtotst	1	0.00024814	0.00010502	2.36	0.0183	0.00004205 0.00045424
mdayst	1	0.00011156	0.00015272	0.73	0.4653	-0.00018813 0.00041125
yr	1	-0.05355	0.02038	-2.63	0.0087	-0.09354 -0.01356

- year effect significant
- hooktype by year interaction not significant

## SUMMARY DOCUMENT FOR COMPARING HOOK TYPES B1 vs B

### HOOK TYPES:

A = Offset 9/0 J hook with squid bait (used in 2002 & 2003 experiments)  
B = Non-Offset 18/0 Circle hook with squid bait (used in 2002 & 2003 experiments)  
B1 = Offset 18/0 Circle hook with squid bait (used only in 2002 experiment)  
C = Offset 18/0 Circle hook with mackerel bait (used in 2002 & 2003 experiments)  
D = 20/0 Circle Hook with Mackerel Bait (used only in 2003)  
E = 10/0 J tuna (Japanese) Hook with Mackerel Bait (used only in 2003)  
F = Offset 9/0 J hook with mackerel bait (used only in 2002)

### 2002 Experiment:

Trt 4: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Non-offset 18/0 circle hook with squid bait (B)  
  
Trt 5: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Offset 18/0 circle hook with squid bait (B1)  
  
Trt 6: Cont: Offset 9/0 J hook with mackerel bait (F)  
Expt: Offset 18/0 circle hook with mackerel bait (C)

### 2003 Experiment:

#### SWORDFISH DIRECTED SETS:

Trt 4: (Set 1) Cont: 9/0 J Hook with Squid Bait (A)  
Expt: Non-offset 18/0 Circle Hook with Squid Bait (B)  
  
Trt 7: (Set 2) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 20/0 Circle Hook with Mackerel Bait (D)  
  
Trt 8: (Set 3) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 10/0 J tuna (Japanese) Hook with Mackerel Bait (E)

AKS notes: applicable to attached tables 1 and 2  
(C for control and E for Experimental below, # before it is trt #, and # in parenthesis is year)

Line 1 compares : 5E (2002) vs 4E (2002)  
Line 4 compares : 5E (2002) vs 4E (2002) and 4E (2003)

SUMMARY TABLE 1 (TURTLES - COUNTS)

Obs	species	comparison	p_hktype
1	LH	B1(02)_vs_B(02, unpaired)	0.2971
2	LH	B1(02)_vs_B(pool ed 02, 03)	0.2974
3	LB	B1(02)_vs_B(02, unpaired)	0.2795
4	LB	B1(02)_vs_B(pool ed 02, 03)	0.3050

SUMMARY TABLE 2 (FISH - WEIGHT)

Obs	species	comparison	p_hktype
1	SF	B1(02)_vs_B(02, unpaired)	0.0355
2	SF	B1(02)_vs_B(pool ed 02, 03)	0.0324
3	BT	B1(02)_vs_B(02, unpaired)	0.4595
4	BT	B1(02)_vs_B(pool ed 02, 03)	0.4357

### Comparison of offset and non-offset 18/0 circle hook with squid bait for LH & LB turtles

From 2002 data, there is no significant difference in (model based) reduction rates due to non-offset 18/0 circle hook with squid bait (4E) and offset 18/0 circle hook with squid bait (5E) for LH and LB.

#### LH (COUNTS):

4 LH caught in 71902 hooks in 4E and 6 LH caught in 70738 hooks in 5E.  
 Unadjusted OR = 1.525 and adjusted OR = 2.037  
 Unadjusted p-value=0.5135 and adjusted p-value =0.2971  
 (adjusted for temperature, total soak time, and daylight soak time)

#### LB (COUNTS):

13 LB caught in 71902 hooks in 4E and 18 LB caught in 70738 hooks in 5E.  
 Unadjusted OR = 1.407 and adjusted OR = 1.488  
 Unadjusted p-value=0.3478 and adjusted p-value =0.2795  
 (adjusted for temperature, total soak time, and daylight soak time)

After combining data for non-offset 18/0 circle hook with squid bait (from 2002 and 2003) and adjusting for year effect, the above conclusion still stands. i.e., there is no significant difference in (model based) reduction rates due to non-offset 18/0 circle hook with squid bait and offset 18/0 circle hook with squid bait for LH and LB.

#### LH (COUNTS):

4 LH caught in 71902 hooks in 4E in 2002 and 16 LH caught in 112558 hooks in 4E in 2003  
 6 LH caught in 70738 hooks in 5E in 2002.  
 Unadjusted OR = 0.782 and adjusted OR = 1.985  
 Unadjusted p-value=0.5980 and adjusted p-value =0.2974 (p-value for year effect=0.0120)  
 (adjusted for temperature, total soak time, daylight soak time, and year)

#### LB (COUNTS):

13 LB caught in 71902 hooks in 4E in 2002 and 3 LB caught in 112558 hooks in 4E in 2003  
 18 LB caught in 70738 hooks in 5E in 2002.  
 Unadjusted OR = 2.934 and adjusted OR = 1.454  
 Unadjusted p-value=0.0017 and adjusted p-value =0.3050 (p-value for year effect=0.0039)  
 (adjusted for temperature, total soak time, daylight soak time, and year)

### Comparison of offset and non-offset 18/0 circle hook with squid bait for SF and BT

From 2002 data, there is significant difference in (model based) reduction rates due to non-offset 18/0 circle hook with squid bait (4E) and offset 18/0 circle hook with squid bait (5E) for SF (but not for BT).

#### SF (WEIGHT):

Unadjusted cph: 1.22 cph based on 71902 hooks in 4E and 1.47 cph based on 70738 hooks in 5E  
 Adjusted cph: 1.21 cph based on 71902 hooks in 4E and 1.48 cph based on 70738 hooks in 5E  
 Unadjusted p-value=0.0552 and adjusted p-value =0.0355  
 (adjusted for temperature, total soak time, and daylight soak time)

#### BT (WEIGHT):

Unadjusted cph: 0.28 cph based on 71902 hooks in 4E and 0.24 cph based on 70738 hooks in 5E  
 Adjusted cph: 0.28 cph based on 71902 hooks in 4E and 0.24 cph based on 70738 hooks in 5E  
 Unadjusted p-value=0.4833 and adjusted p-value =0.4595  
 (adjusted for temperature, total soak time, and daylight soak time)

After combining data for non-offset 18/0 circle hook with squid bait (from 2002 and 2003) and adjusting for year effect, the above conclusions still stands. i.e., there is significant difference in (model based) reduction rates due to non-offset 18/0 circle hook with squid bait and offset 18/0 circle hook with squid bait for SF (but not for BT)

#### SF (WEIGHT):

Unadjusted cph: 1.22 cph based on 71902 hooks in 4E in 2002 and 1.25 cph based on 112558 hooks in 4E in 2003  
 1.47 cph based on 70738 hooks in 5E  
 Adjusted cph: 1.22 cph based on 184490 hooks in 4E and 1.49 cph based on 70738 hooks in 5E  
 Unadjusted p-value=0.0320 and adjusted p-value =0.0324 (p-value for year effect=0.4796)  
 (adjusted for temperature, total soak time, and daylight soak time, and year)

#### BT (WEIGHT):

Unadjusted cph: 0.28 cph based on 71902 hooks in 4E in 2002 and 0.16 cph based on 112558 hooks in 4E in 2003  
 0.24 cph based on 70738 hooks in 5E  
 Adjusted cph: 0.22 cph based on 184490 hooks in 4E and 0.18 cph based on 70738 hooks in 5E  
 Unadjusted p-value=0.6254 and adjusted p-value =0.4357 (p-value for year effect=0.0358)  
 (adjusted for temperature, total soak time, and daylight soak time, and year)

LH, B1 vs B, 2002, unpaired data

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-34.1841	5.6473	36.6409	<.0001
hooktype	1	-0.7117	0.6826	1.0871	0.2971
mtempot	1	0.3450	0.0867	15.8186	<.0001
mtotst	1	0.00315	0.00307	1.0489	0.3058
mdayst	1	0.00188	0.00531	0.1250	0.7237

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.491	0.129	1.870
mtempot	1.412	1.191	1.674
mtotst	1.003	0.997	1.009
mdayst	1.002	0.992	1.012

LH, B1 (2002) vs B (2002 & 2003)

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-35.6323	3.6982	92.8345	<.0001
hooktype	1	-0.6856	0.6579	1.0860	0.2974
mtempot	1	0.3643	0.0546	44.5582	<.0001
mtotst	1	0.00568	0.00215	6.9392	0.0084
mdayst	1	-0.00600	0.00427	1.9734	0.1601
yr	1	1.5079	0.6003	6.3096	0.0120

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.504	0.139	1.829
mtempot	1.439	1.293	1.602
mtotst	1.006	1.001	1.010
mdayst	0.994	0.986	1.002
yr	4.517	1.393	14.650

LB, B1 vs B, 2002, unpaired data

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-19.0325	4.0011	22.6278	<.0001
hooktype	1	-0.3976	0.3677	1.1695	0.2795
mtempot	1	0.1310	0.0611	4.5978	0.0320
mtotst	1	0.00314	0.00176	3.1781	0.0746
mdayst	1	0.000525	0.00308	0.0290	0.8647

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.672	0.327 1.381
mtempot	1.140	1.011 1.285
mtotst	1.003	1.000 1.007
mdayst	1.001	0.995 1.007

LB, B1 (2002) vs B (2002 & 2003)

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-19.1975	3.8344	25.0661	<.0001
hooktype	1	-0.3743	0.3649	1.0520	0.3050
mtempot	1	0.1441	0.0576	6.2631	0.0123
mtotst	1	0.00263	0.00168	2.4444	0.1179
mdayst	1	-0.00063	0.00304	0.0431	0.8356
yr	1	-1.9198	0.6661	8.3067	0.0039

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.688	0.336 1.406
mtempot	1.155	1.032 1.293
mtotst	1.003	0.999 1.006
mdayst	0.999	0.993 1.005
yr	0.147	0.040 0.541

SF, B1 vs B, 2002, unpaired data

Level of hooktype	N	sfcpuh	mtempot	mtotst	mdayst				
		Mean	Std Dev						
0	160	1. 47127096	1. 37101437	62. 2841757	2. 84796144	761. 035331	88. 302252	221. 911797	62. 8393070
1	165	1. 22447477	0. 98594772	62. 4946574	2. 91741943	757. 299122	112. 535250	226. 590719	76. 084424

The GLM Procedure

#### Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1=LSMean2 Pr >  t
0	1. 48298723	0. 09100941	<. 0001	0. 0355
1	1. 21311354	0. 08961759	<. 0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1. 482987	1. 303935 1. 662040
1	1. 213114	1. 036799 1. 389428

#### Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i)-LSMean(j)
1	2	0. 269874	0. 018376 0. 521371

#### Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-2. 99103	1. 55757	-1. 92	0. 0557	-6. 05540 0. 07334
hooktype	1	-0. 26987	0. 12783	-2. 11	0. 0355	-0. 52137 -0. 01838
mtempot	1	0. 05055	0. 02301	2. 20	0. 0287	0. 00529 0. 09582
mtotst	1	0. 00077134	0. 00073963	1. 04	0. 2978	-0. 00068382 0. 00223
mdayst	1	0. 00327	0. 00109	3. 01	0. 0028	0. 00113 0. 00542

SF, B1 (2002) vs B (2002 & 2003)

The GLM Procedure

Level of hooktype	N	sfcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	160	1.47127096	1.37101437	62.2841757	2.84796144	761.035331	88.302252	221.911797	62.8393070
1	376	1.23789760	1.06905629	61.8623817	2.94698728	791.230198	148.626432	254.371685	94.0541444

The GLM Procedure

Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	HO: LSMEAN=0 Pr >  t	HO: LSMean1= LSMean2 Pr >  t
0	1.48821533	0.10769528	<.0001	0.0324
1	1.21740463	0.05923519	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1.488215	1.276653 1.699777
1	1.217405	1.101040 1.333769

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i)-LSMean(j)
1	2	0.270811	0.022759 0.518862

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-0.88803	1.18300	-0.75	0.4532	-3.21198 1.43592
hooktype	1	-0.27081	0.12627	-2.14	0.0324	-0.51886 -0.02276
mtempot	1	0.03053	0.01764	1.73	0.0840	-0.00411 0.06518
mtotst	1	-0.00040146	0.00052007	-0.77	0.4405	-0.00142 0.00062019
mdayst	1	0.00344	0.00082108	4.19	<.0001	0.00183 0.00505
yr	1	-0.08762	0.12385	-0.71	0.4796	-0.33093 0.15569

BT, B1 vs B, 2002, unpaired data

The GLM Procedure

Level of hooktype	N	btcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	160	0.23336803	0.48932939	62.2841757	2.84796144	761.035331	88.302252	221.911797	62.8393070
1	165	0.27903757	0.57400373	62.4946574	2.91741943	757.299122	112.535250	226.590719	76.0844241

The GLM Procedure

Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0		H0: LSMean1= LSMean2 Pr >  t
			Pr >  t	Pr >  t	
0	0.23508965	0.04064845	<.0001		0.4595
1	0.27736813	0.04002681	<.0001		

hooktype	btcpuh LSMEAN	95% Confidence Limits		
		0	0.198619	0.356117
0	0.235090			
1	0.277368			

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)		
			95% Confidence Limits for LSMean(i) - LSMean(j)	Pr >  t	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.042278	-0.154607	0.070050	

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-3.33538	0.69567	-4.79	<.0001	-4.70405 -1.96671
hooktype	1	0.04228	0.05709	0.74	0.4595	-0.07005 0.15461
mtempot	1	0.04532	0.01028	4.41	<.0001	0.02511 0.06554
mtotst	1	0.00111	0.00033035	3.35	0.0009	0.00045581 0.00176
mdayst	1	-0.00043115	0.00048633	-0.89	0.3760	-0.00139 0.00052566

BT, B1 (2002) vs B (2002 & 2003)

The GLM Procedure

Level of hooktype	N	btcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	160	0.23336803	0.48932939	62.2841757	2.84796144	761.035331	88.302252	221.911797	62.8393070
1	376	0.21387629	0.49800818	61.8623817	2.94698728	791.230198	148.626432	254.371685	94.0541444

Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	HO: LSMEAN=0	HO: LSMean1=
			Pr >  t	LSMean2 Pr >  t
0	0.17843131	0.04590194	0.0001	0.4357
1	0.22040938	0.02524725	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits		
		0	0.088259	0.268603
0	0.178431	0.170812	0.270006	
1	0.220409			

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i)-LSMean(j)		
		-0.041978	-0.147703	0.063747	
1	2	-0.041978	-0.147703	0.063747	

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1.95245	0.50422	-3.87	0.0001	-2.94297 -0.96194
hooktype	1	0.04198	0.05382	0.78	0.4357	-0.06375 0.14770
mtempot	1	0.02894	0.00752	3.85	0.0001	0.01417 0.04370
mtotst	1	0.00052993	0.00022166	2.39	0.0172	0.00009449 0.00096538
mdayst	1	-0.00008970	0.00034996	-0.26	0.7978	-0.00077718 0.00059779
yr	1	-0.11111	0.05279	-2.10	0.0358	-0.21482 -0.00741

## SUMMARY DOCUMENT FOR COMPARING HOOK TYPES A vs B1

### HOOK TYPES:

A = Offset 9/0 J hook with squid bait (used in 2002 & 2003 experiments)  
B = Non-Offset 18/0 Circle hook with squid bait (used in 2002 & 2003 experiments)  
B1 = Offset 18/0 Circle hook with squid bait (used only in 2002 experiment)  
C = Offset 18/0 Circle hook with mackerel bait (used in 2002 & 2003 experiments)  
D = 20/0 Circle Hook with Mackerel Bait (used only in 2003)  
E = 10/0 J tuna (Japanese) Hook with Mackerel Bait (used only in 2003)  
F = Offset 9/0 J hook with mackerel bait (used only in 2002)

### 2002 Experiment:

Trt 4: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Non-offset 18/0 circle hook with squid bait (B)  
  
Trt 5: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Offset 18/0 circle hook with squid bait (B1)  
  
Trt 6: Cont: Offset 9/0 J hook with mackerel bait (F)  
Expt: Offset 18/0 circle hook with mackerel bait (C)

### 2003 Experiment:

#### SWORDFISH DIRECTED SETS:

Trt 4: (Set 1) Cont: 9/0 J Hook with Squid Bait (A)  
Expt: Non-offset 18/0 Circle Hook with Squid Bait (B)  
  
Trt 7: (Set 2) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 20/0 Circle Hook with Mackerel Bait (D)  
  
Trt 8: (Set 3) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 10/0 J tuna (Japanese) Hook with Mackerel Bait (E)

AKS notes: applicable to attached tables 1 and 2  
(C for control and E for Experimental below, # before it is trt #, and # in parenthesis is year)

Lines 1 & 4 compare : 5C (2002) vs 5E (2002)  
Lines 2 & 5 compare : 4C (2002) and 5C (2002) vs 5E (2002)  
Lines 3 & 6 compare : 4C (2002) and 5C (2002) and 4C (2003) vs 5E (2002)

SUMMARY TABLE 1 (TURTLES - COUNTS)

Obs	species	comparison	or	lcl	ucl	red_rate	lconflict	uconflict	p_hktype
				95%	95%		95%	95%	
1	LH	A(02)_vs_B1(02, paired)	0.150	0.064	0.353	85.0	64.7	93.6	0.0001
2	LH	A(pool ed 02)_vs_B1(02)	0.176	0.077	0.406	82.4	59.4	92.3	0.0001
3	LH	A(pool ed 02, 03)_vs_B1(02)	0.183	0.079	0.421	81.7	57.9	92.1	0.0001
4	LB	A(02)_vs_B1(02, paired)	0.500	0.284	0.880	50.0	12.0	71.6	0.0163
5	LB	A(pool ed 02)_vs_B1(02)	0.514	0.306	0.861	48.6	13.9	69.4	0.0115
6	LB	A(pool ed 02, 03)_vs_B1(02)	0.516	0.308	0.865	48.4	13.5	69.2	0.0120

SUMMARY TABLE 2 (FISH - WEIGHT)

Obs	species	comparison	cphcont	cphext	red_rate	lconflict	uconflict	p_hktype
			(LS Mean)	(LS Mean)		95%	95%	
1	SF	A(02)_vs_B1(02, paired)	2.06679	1.47127	28.8139	13.5196	44.1081	0.0002
2	SF	A(pool ed 02)_vs_B1(02)	1.93531	1.47989	23.5320	9.5994	37.4646	0.0010
3	SF	A(pool ed 02, 03)_vs_B1(02)	1.81334	1.35955	25.0251	10.0726	39.9776	0.0011
4	BT	A(02)_vs_B1(02, paired)	0.19064	0.23337	-22.4161	-73.2494	28.4177	0.3863
5	BT	A(pool ed 02)_vs_B1(02)	0.20335	0.23363	-14.8921	-55.0605	25.2758	0.4667
6	BT	A(pool ed 02, 03)_vs_B1(02)	0.16828	0.19966	-18.6483	-63.9703	26.6743	0.4195

trt A vs B1, LH, 2002, paired data, per haul analysis

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-26.8445	3.4591	60.2265	<.0001
hooktype	1	-1.8982	0.4379	18.7925	<.0001
mtempot	1	0.2192	0.0476	21.2153	<.0001
mtotst	1	0.00752	0.00197	14.5501	0.0001
mdayst	1	-0.00144	0.00262	0.3028	0.5822

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.150	0.064	0.353
mtempot	1.245	1.134	1.367
mtotst	1.008	1.004	1.011
mdayst	0.999	0.993	1.004

trt A (pooled) vs B1, LH, 2002, unpaired data, per haul analysis  
The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-26.1163	1.9946	171.4389	<.0001
hooktype	1	-1.7356	0.4255	16.6408	<.0001
mtempot	1	0.2432	0.0302	65.0379	<.0001
mtotst	1	0.00592	0.00118	25.1842	<.0001
mdayst	1	-0.00651	0.00225	8.3533	0.0038

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
		Lower	Upper
hooktype	0.176	0.077	0.406
mtempot	1.275	1.202	1.353
mtotst	1.006	1.004	1.008
mdayst	0.994	0.989	0.998

trt (A pooled from 2002 and 2003) vs(B1 for 2002), LH, per haul analysis  
 LH, yr=0 means year=2002 and yr=1 means year=2003

#### Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-30.9446	1.5513	397.8818	<.0001
hooktype	1	-1.6996	0.4255	15.9520	<.0001
mtempot	1	0.3132	0.0227	190.7607	<.0001
mtotst	1	0.00687	0.000975	49.7289	<.0001
mdayst	1	-0.00875	0.00191	21.0443	<.0001
yr	1	0.1930	0.2068	0.8707	0.3508

#### Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.183	0.079 0.421
mtempot	1.368	1.308 1.430
mtotst	1.007	1.005 1.009
mdayst	0.991	0.988 0.995
yr	1.213	0.809 1.819

yr not sign in the model (may be inappropriate to test for yr diff since no data for both hook types in both yrs)  
 yr by hooktype interaction can't be computed

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trt A vs B1, LB, 2002, paired data, per haul analysis  
 The LOGISTIC Procedure

#### Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-14.7413	3.5492	17.2512	<.0001
hooktype	1	-0.6934	0.2887	5.7680	0.0163
mtempot	1	0.1341	0.0517	6.7203	0.0095
mtotst	1	-0.00192	0.00187	1.0527	0.3049
mdayst	1	0.000805	0.00266	0.0919	0.7618

#### Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.500	0.284 0.880
mtempot	1.144	1.033 1.266
mtotst	0.998	0.994 1.002
mdayst	1.001	0.996 1.006

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trt A (pool ed) vs B1, 1b, 2002, LB, unpaired data, per haul analysis

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-16.9394	2.5408	44.4498	<.0001
hooktype	1	-0.6661	0.2636	6.3840	0.0115
mtempot	1	0.1600	0.0377	17.9886	<.0001
mtotst	1	-0.00117	0.00137	0.7362	0.3909
mdayst	1	0.000692	0.00196	0.1241	0.7246

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.514	0.306 0.861
mtempot	1.173	1.090 1.263
mtotst	0.999	0.996 1.002
mdayst	1.001	0.997 1.005

trt (A pooled from 2002 and 2003) vs (B1 for 2002), LB, per haul analysis  
1b, yr=0 means year=2002 and yr=1 means year=2003

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi Sq
Intercept	1	-18.8059	2.1823	74.2582	<.0001
hooktype	1	-0.6621	0.2636	6.3063	0.0120
mtempot	1	0.1830	0.0323	32.0773	<.0001
mtotst	1	-0.00111	0.00117	0.9036	0.3418
mdayst	1	0.00221	0.00166	1.7657	0.1839
yr	1	-0.5410	0.2339	5.3484	0.0207

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits
hooktype	0.516	0.308 0.865
mtempot	1.201	1.127 1.279
mtotst	0.999	0.997 1.001
mdayst	1.002	0.999 1.005
yr	0.582	0.368 0.921

yr sign in the model (may be inappropriate to test for yr diff since no data for both hook types in both yrs)  
yr by hooktype interaction can't be computed

---

trt A vs B1, SF, 2002, paired data, per haul analysis  
 The GLM Procedure  
 Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0		H0: LSMean1= LSMean2 Pr >  t
			Pr >  t	<.0001	
0	2.06679427	0.11360309		<.0001	0.0002
1	1.47127096	0.11360309		<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits		
		0	2.066794	1.843278 2.290311
1	1.471271		1.247754	1.694788

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)		
			0.595523	0.279423	0.911624
1	2	0.595523		0.279423	0.911624

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-4.28863	2.09178	-2.05	0.0412	-8.40425 -0.17301
hooktype	1	-0.59552	0.16066	-3.71	0.0002	-0.91162 -0.27942
mtempot	1	0.06036	0.02986	2.02	0.0441	0.00160 0.11912
mtotst	1	0.00194	0.00104	1.87	0.0629	-0.00010486 0.00398
mdayst	1	0.00505	0.00147	3.43	0.0007	0.00216 0.00795

trt A (pooled) vs B1, SF, 2002, unpaired data, per haul analysis  
 The GLM Procedure  
 Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0		H0: LSMean1= LSMean2 Pr >  t
			Pr >  t	<.0001	
0	1.93531016	0.07879829		<.0001	0.0010
1	1.47989253	0.11231942		<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits		
		0	1.935310 2.090142	
1	1.479893		1.259194 1.700591	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)		
			0.455418	0.185778	0.725057
1	2	0.455418		0.185778	0.725057

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1.70212	1.60444	-1.06	0.2893	-4.85472 1.45049
hooktype	1	-0.45542	0.13723	-3.32	0.0010	-0.72506 -0.18578
mtempot	1	0.04032	0.02346	1.72	0.0864	-0.00578 0.08643
mtotst	1	0.00033891	0.00077171	0.44	0.6607	-0.00118 0.00186
mdayst	1	0.00387	0.00112	3.44	0.0006	0.00166 0.00608

trt (A pooled from 2002 and 2003) vs(B1 for 2002), per haul analysis  
SF, yr=0 means year=2002 and yr=1 means year=2003

The GLM Procedure  
Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	1.81333746	0.06377531	<.0001	0.0011
1	1.35954760	0.12976417	<.0001	

hooktype	sfcpuh LSMEAN	95% Confidence Limits
0	1.813337	1.688121 1.938554
1	1.359548	1.104768 1.614328

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.453790	0.182650 0.724929

The GLM Procedure

Level of yr	N	sfcpuh Mean	sfcpuh Std Dev	mtempot Mean	mtempot Std Dev	mtotst Mean	mtotst Std Dev	mdayst Mean	mdayst Std Dev
0	485	1.78506929	1.46665423	62.3557829	2.86758148	759.764249	97.042879	223.503595	67.534267
1	211	1.74703290	1.46881456	61.3679480	2.88127916	817.763979	167.164518	276.096137	100.972007

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	0.17892	1.32234	0.14	0.8924	-2.41738 2.77521
hooktype	1	-0.45379	0.13810	-3.29	0.0011	-0.72493 -0.18265
mtempot	1	0.02494	0.01960	1.27	0.2036	-0.01354 0.06341
mtotst	1	-0.00097220	0.00059133	-1.64	0.1006	-0.00213 0.00018882
mdayst	1	0.00420	0.00092057	4.57	<.0001	0.00240 0.00601
yr	1	-0.32778	0.13353	-2.45	0.0143	-0.58996 -0.06561

trt A vs B1, BT, 2002, paired data, per haul analysis  
 The GLM Procedure  
 Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.19063511	0.03482716	<.0001	0.3863
1	0.23336803	0.03482716	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.190635	0.122112 0.259158
1	0.233368	0.164845 0.301891

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.042733	-0.139639 0.054174

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-3.24955	0.64127	-5.07	<.0001	-4.51127 -1.98783
hooktype	1	0.04273	0.04925	0.87	0.3863	-0.05417 0.13964
mtempot	1	0.03817	0.00916	4.17	<.0001	0.02015 0.05618
mtotst	1	0.00161	0.00031830	5.05	<.0001	0.00098122 0.00223
mdayst	1	-0.00072284	0.00045117	-1.60	0.1101	-0.00161 0.00016483

trt A (pool ed) vs B1, BT, 2002, unpai red data, per haul analysis

The GLM Procedure  
Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.20334934	0.02387029	<.0001	0.4667
1	0.23363268	0.03402481	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.203349	0.156446 0.250253
1	0.233633	0.166777 0.300489

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.030283	-0.111965 0.051398

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-2.78154	0.48603	-5.72	<.0001	-3.73656 -1.82653
hooktype	1	0.03028	0.04157	0.73	0.4667	-0.05140 0.11196
mtempot	1	0.03479	0.00711	4.89	<.0001	0.02082 0.04875
mtotst	1	0.00120	0.00023377	5.14	<.0001	0.00074331 0.00166
mdayst	1	-0.00043826	0.00034065	-1.29	0.1989	-0.00111 0.00023109

trt (A pooled from 2002 and 2003 )vs(B1 for 2002), BT, per haul analysis  
 yr=0 means year=2002 and yr=1 means year=2003

The GLM Procedure  
 Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1=LSMean2 Pr >  t
0	0.16827790	0.01793909	<.0001	0.4195
1	0.19965851	0.03650083	<.0001	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.168278	0.133056 0.203500
1	0.199659	0.127992 0.271325

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	-0.031381	-0.107648 0.044887

The GLM Procedure

Level of yr	N	btcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	485	0.21333972	0.44910126	62.3557829	2.86758148	759.764249	97.042879	223.503595	67.534267
1	211	0.13549824	0.30872258	61.3679480	2.88127916	817.763979	167.164518	276.096137	100.972007

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1.77621	0.37196	-4.78	<.0001	-2.50651 -1.04591
hooktype	1	0.03138	0.03884	0.81	0.4195	-0.04489 0.10765
mtempot	1	0.02510	0.00551	4.55	<.0001	0.01428 0.03593
mtotst	1	0.00056053	0.00016633	3.37	0.0008	0.00023395 0.00088711
mdayst	1	-0.00005346	0.00025894	-0.21	0.8365	-0.00056187 0.00045495
yr	1	-0.07239	0.03756	-1.93	0.0543	-0.14614 0.00136

## SUMMARY DOCUMENT FOR COMPARING HOOK TYPES A vs F and B1 vs C

### HOOK TYPES:

A = Offset 9/0 J hook with squid bait (used in 2002 & 2003 experiments)  
B = Non-Offset 18/0 Circle hook with squid bait (used in 2002 & 2003 experiments)  
B1 = Offset 18/0 Circle hook with squid bait (used only in 2002 experiment)  
C = Offset 18/0 Circle hook with mackerel bait (used in 2002 & 2003 experiments)  
D = 20/0 Circle Hook with Mackerel Bait (used only in 2003)  
E = 10/0 J tuna (Japanese) Hook with Mackerel Bait (used only in 2003)  
F = Offset 9/0 J hook with mackerel bait (used only in 2002)

### 2002 Experiment:

- Trt 4: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Non-offset 18/0 circle hook with squid bait (B)
- Trt 5: Cont: Offset 9/0 J hook with squid bait (A)  
Expt: Offset 18/0 circle hook with squid bait (B1)
- Trt 6: Cont: Offset 9/0 J hook with mackerel bait (F)  
Expt: Offset 18/0 circle hook with mackerel bait (C)

### 2003 Experiment:

#### SWORDFISH DIRECTED SETS:

- Trt 4: (Set 1) Cont: 9/0 J Hook with Squid Bait (A)  
Expt: Non-offset 18/0 Circle Hook with Squid Bait (B)
- Trt 7: (Set 2) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 20/0 Circle Hook with Mackerel Bait (D)
- Trt 8: (Set 3) Cont: Offset 18/0 Circle Hook with Mackerel Bait (C)  
Expt: 10/0 J tuna (Japanese) Hook with Mackerel Bait (E)

AKS notes: applicable to attached tables 1 and 2  
(C for control and E for Experimental below, # before it is trt #, and # in parenthesis is year)

Lines 1 & 3 compare : 4C (2002) and 5C (2002) vs 5C (2002)  
Lines 2 & 4 compare : 5E (2002) and 6E (2002)

SUMMARY TABLE 1 (TURTLES - COUNTS)

obs	species	comparison	or	l cl	ucl	red_rate	l confl t	uconfl t	p_hktype
				95%	95%		95%	95%	
1	LH	A_vs_F	0.291	0.145	0.585	70.9	41.5	85.5	0.0005
2	LH	B1_vs_C	0.505	0.126	2.034	49.5	-100.0*	87.4	0.3367
3	LB	A_vs_F	0.344	0.187	0.634	65.6	36.6	81.3	0.0006
4	LB	B1_vs_C	0.674	0.324	1.402	32.6	-40.2	67.6	0.2908

\* rounded upward

SUMMARY TABLE 2 (FISH - WEIGHT)

Obs	species	comparison	cphcont	cphexpt	red_rate	l confl t	uconfl t	p_hktype
					95%			
1	SF	A_vs_F	1.94808	3.18307	-63.3950	-80.8784	-45.912	.0001
2	SF	B1_vs_C	1.50420	2.52192	-67.6580	-91.4341	-43.882	.0001
3	BT	A_vs_F	0.20403	0.01991	90.2431	58.0324	100.000*	.0001
4	BT	B1_vs_C	0.23347	0.03929	83.1721	50.5148	100.000*	.0001

\* rounded downward

Trt A vs F, 2002 data, LH, per haul analysis

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-26.4121	1.9872	176.6482	<.0001
hooktype	1	-1.2339	0.3560	12.0152	0.0005
mtempot	1	0.2438	0.0299	66.6378	<.0001
mtotst	1	0.00647	0.00116	31.3514	<.0001
mdayst	1	-0.00736	0.00223	10.8765	0.0010

Odds Ratio Estimates

Effect	Point Estimate	95% Confidence Limits	Wald
hooktype	0.291	0.145	0.585
mtempot	1.276	1.204	1.353
mtotst	1.006	1.004	1.009
mdayst	0.993	0.988	0.997

Trt B1 vs C, 2002 data, LH, per haul analysis

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-26.6606	8.7264	9.3341	0.0022
hooktype	1	-0.6827	0.7106	0.9231	0.3367
mtempot	1	0.2374	0.1243	3.6495	0.0561
mtotst	1	0.00265	0.00445	0.3561	0.5507
mdayst	1	0.00108	0.00611	0.0315	0.8592

Odds Ratio Estimates

Effect	Point Estimate	95% Confidence Limits	Wald
hooktype	0.505	0.126	2.034
mtempot	1.268	0.994	1.618
mtotst	1.003	0.994	1.011
mdayst	1.001	0.989	1.013

Trt A vs F, 2002 data, 1b, per haul analysis

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-16.8901	2.6819	39.6613	<.0001
hooktype	1	-1.0673	0.3121	11.6959	0.0006
mtempot	1	0.1690	0.0397	18.1602	<.0001
mtotst	1	-0.00195	0.00144	1.8301	0.1761
mdayst	1	0.000459	0.00209	0.0485	0.8257

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
hooktype	0.344	0.187	0.634
mtempot	1.184	1.096	1.280
mtotst	0.998	0.995	1.001
mdayst	1.000	0.996	1.005

Trt B1 vs C, 2002 data, 1b, per haul analysis

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Chi-Square	Pr > Chi Sq
Intercept	1	-20.7199	4.8617	18.1632	<.0001
hooktype	1	-0.3950	0.3739	1.1158	0.2908
mtempot	1	0.1739	0.0686	6.4302	0.0112
mtotst	1	0.00222	0.00245	0.8230	0.3643
mdayst	1	-0.00085	0.00351	0.0591	0.8080

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
hooktype	0.674	0.324	1.402
mtempot	1.190	1.040	1.361
mtotst	1.002	0.997	1.007
mdayst	0.999	0.992	1.006

Trt A vs F, 2002 data, SF, per haul analysis

The GLM Procedure

Level of hooktype	N	sfcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	325	1. 93955462	1. 48940650	62. 3910357	2. 88091232	759. 138486	101. 193931	224. 287250	69. 8102322
1	158	3. 20061270	2. 36632890	62. 3384931	2. 88792424	764. 568259	93. 454049	229. 342085	63. 1459615

The GLM Procedure  
Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0		H0: LSMean1= LSMean2 Pr >  t
			Pr >  t	<. 0001	
0	1. 94808311	0. 09908713		<. 0001	<. 0001
1	3. 18306993	0. 14214923		<. 0001	
hooktype		sfcpuh LSMEAN	95% Confidence Limits		
0	1. 948083		1. 753383	2. 142783	
1	3. 183070		2. 903755	3. 462385	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)	
			-1. 234987	-1. 575578 -0. 894396
1	2	-1. 234987	-1. 575578	-0. 894396

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1. 47424	2. 03753	-0. 72	0. 4697	-5. 47785 2. 52937
hooktype	1	1. 23499	0. 17333	7. 12	<. 0001	0. 89440 1. 57558
mtempot	1	0. 03173	0. 02969	1. 07	0. 2857	-0. 02660 0. 09007
mtotst	1	0. 00039198	0. 00097871	0. 40	0. 6890	-0. 00153 0. 00232
mdayst	1	0. 00507	0. 00145	3. 50	0. 0005	0. 00222 0. 00791

Trt B1 vs C, 2002 data, SF, per haul analysis

The GLM Procedure

Level of hooktype	N	sfcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	160	1. 47127096	1. 37101437	62. 2841757	2. 84796144	761. 035331	88. 3022520	221. 911797	62. 8393070
1	158	2. 55526372	2. 02560663	62. 3384931	2. 88792424	764. 568259	93. 4540490	229. 342085	63. 1459615

The GLM Procedure  
Least Squares Means

hooktype	sfcpuh LSMEAN	Standard Error	H0: LSMEAN=0		H0: LSMean1= LSMean2 Pr >  t
			Pr >  t	<. 0001	
0	1. 50420222	0. 12800784		<. 0001	
1	2. 52191560	0. 12881693		<. 0001	
hooktype		sfcpuh LSMEAN	95% Confidence Limits		
0		1. 504202	1. 252338	1. 756067	
1		2. 521916	2. 268459	2. 775372	

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)	
			-1. 375354	-0. 660073
1	2	-1. 017713		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-3. 25180	2. 39866	-1. 36	0. 1762	-7. 97133 1. 46773
hooktype	1	1. 01771	0. 18177	5. 60	<. 0001	0. 66007 1. 37535
mtempot	1	0. 01784	0. 03409	0. 52	0. 6010	-0. 04923 0. 08491
mtotst	1	0. 00253	0. 00118	2. 14	0. 0332	0. 00020294 0. 00487
mdayst	1	0. 00758	0. 00173	4. 39	<. 0001	0. 00419 0. 01098

Trt A vs F, 2002 data,, bt, per haul analysis

The GLM Procedure

Level of hooktype	N	btcpuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	325	0.20347963	0.42836051	62.3910357	2.88091232	759.138486	101.193931	224.287250	69.8102322
1	158	0.02104204	0.08261466	62.3384931	2.88792424	764.568259	93.454049	229.342085	63.1459615

The GLM Procedure  
Least Squares Means

hooktype	btcpuh LSMEAN	Standard Error	H0: LSMEAN=0 Pr >  t	H0: LSMean1= LSMean2 Pr >  t
0	0.20403131	0.01911975	<.0001	<.0001
1	0.01990725	0.02742897	0.4683	

hooktype	btcpuh LSMEAN	95% Confidence Limits
0	0.204031	0.166462 0.241600
1	0.019907	-0.033989 0.073804

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)
1	2	0.184124	0.118404 0.249844

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-1.79514	0.39316	-4.57	<.0001	-2.56768 -1.02261
hooktype	1	-0.18412	0.03345	-5.51	<.0001	-0.24984 -0.11840
mtempot	1	0.02366	0.00573	4.13	<.0001	0.01240 0.03491
mtotst	1	0.00075780	0.00018885	4.01	<.0001	0.00038672 0.00113
mdayst	1	-0.00023448	0.00027949	-0.84	0.4019	-0.00078366 0.00031469

Trt B1 vs C, 2002 data, bt, per haul analysis

The GLM Procedure

Level of hooktype	N	btcpuuh		mtempot		mtotst		mdayst	
		Mean	Std Dev						
0	160	0.23336803	0.48932939	62.2841757	2.84796144	761.035331	88.3022520	221.911797	62.8393070
1	158	0.03939022	0.11834210	62.3384931	2.88792424	764.568259	93.4540490	229.342085	63.1459615

The GLM Procedure  
Least Squares Means

hooktype	btcpuuh LSMEAN	Standard Error	H0: LSMEAN=0	H0: LSMean1=
			Pr >  t	LSMean2 Pr >  t
0	0.23346952	0.02728977	<.0001	<.0001
1	0.03928745	0.02746225	0.1535	

hooktype	btcpuuh LSMEAN	95% Confidence Limits		
		0	0.233470	0.179775
1	0.039287	-0.014747	-0.014747	0.093321

Least Squares Means for Effect hooktype

i	j	Difference Between Means	95% Confidence Limits for LSMean(i) - LSMean(j)		
		0.194182	0.117937	0.270427	
1	2	0.194182	0.117937	0.270427	

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr >  t	95% Confidence Limits
Intercept	1	-2.17768	0.51137	-4.26	<.0001	-3.18382
hooktype	1	-0.19418	0.03875	-5.01	<.0001	-0.27043
mtempot	1	0.02845	0.00727	3.92	0.0001	0.01416
mtotst	1	0.00104	0.00025258	4.10	<.0001	0.00053856
mdayst	1	-0.00067289	0.00036792	-1.83	0.0684	-0.00140